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EXAMINER	
NOGUEROLA, ALEXANDER STEPHAN	
ART UNIT	**PAPER NUMBER**
1753	

DATE MAILED: 05/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

AS

Office Action Summary	Application No.	Applicant(s)	
	09/986,489	PAWLISZYN, JANUSZ B.	
	Examiner	Art Unit	
	ALEX NOGUEROLA	1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-34 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-34 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 09 November 2001 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Objections

1. Claim 1 is objected to because of the following informality: in line 3 -- a -- should be inserted between "with" and "printed."

2. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. Claim 28 is rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for providing transparent substrates and means to pass light through the entire channel to *permit* whole column imaging detection, does not reasonably provide enablement for providing transparent substrates and means to pass light through the entire channel to *prevent* whole column imaging detection. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make the invention commensurate in scope with these claims. No discussion, example, or illustration has been found in the original disclosure of providing transparent substrates and means to pass light through the entire channel to *prevent* whole column imaging detection. This would be contrary to the approach one with ordinary skill in the art would take to prevent whole column imaging

detection because using transparent substrates and means to pass light through the entire channel actually enable whole column imaging detection.

4. Claim 32 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention: the category of invention of this claim is not clear because the claim is directed to a method of constructing a microchannel device, yet it has the limitation of using the device to be constructed.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C.102(e)).

6. Claims 1, 2, 7, 8/1, 8/7, 9/1, 9/7, 10/1, 10/7, 11/1, 11/7, 14, 15, 17, 18, 20, 21/1, 21/7, 23/1, 23/7, 24/1, 24/7, 25/1, 25/7, and 29 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Soane et al. (US 6,176,962 B1).

Addressing claim 1, Soane et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 28-33), the channel comprising a first substrate (14) and a second substrate (12) with a printed component (16) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 5, ll. 56-64 and col. 6, ll. 30-41), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 6 and col. 6, ll. 9-17).

Addressing claim 2, sealing contact of the printed component and both substrates is implied by col. 13, ln. 9–13, which teaches that the printed component is used to form microfluidic channels useful for electrophoresis.

Addressing claim 7, as seen in Figure 5 the second substrate provides a cover for the channel.

Addressing claims 8/1 and 8/7, the component may be at least polymeric material (col. 7, ln. 17 – col. 9, ln. 4).

Addressing claims 9/1 and 9/7, Soane et al. teaches that the component may comprise thermocured silicone gums (col. 8, ll. 39-49).

Addressing claims 10/1, 10/7, 11/1, and 11/7, Soane et al. teaches that at least one of the substrates may be transparent or translucent and may be made from glass or plastic (col. 5, ll. 16-31).

Addressing claims 14 and 15, Soane et al. teaches straight channel walls that are parallel to each other (Figure 1).

Addressing claim 17, the substrate may comprise polyethylene (col. 11, ll. 23-24).

Addressing claims 18 and 20, the component is at least 0.5 microns thick (col. 6, ll. 24-30).

Addressing claims 21/1 and 21/7, numerous non-conductive components are disclosed (col. 7, ln. 17 – col. 9, ln. 59).

Addressing claims 23/1, and 23/7, Soane et al. teaches performing electrophoresis (col. 1, ll. 50-67 and col. 10, ll. 29-57).

Addressing claims 24/1, and 24/7, ends as claimed are shown in Figures 1 and 5. An electrolyte vial is implied by col. 1, ll. 50-67 and col. 10, ll. 29-57, which teach performing electrophoresis.

Addressing claims 25/1, and 25/7, an entrance suitable to inject a sample into the channel for electrophoresis (col. 1, ll. 50-67 and col. 10, ll. 29-57 teach performing electrophoresis) is shown in Figure 1. As for performing isoelectrophoresis on the sample this is intended use that does not further patentably distinguish the channel, barring a showing to the contrary, especial since performing electrophoresis is disclosed.

Addressing claim 29, Soane et al. teach a microchannel for separating two or more substances in a sample (abstract and col. 1, ll. 28-33), the channel comprising a first substrate (14) with printed component (16) printed on the first substrate in a shape to define a perimeter of the channel, there being no etching required (first substrata (14) and printed component (16) are flat. Also note that the groove (21) in the second substrate could be molded.).

7. Claims 1-4, 7, 8/1, 8/7, 10/1, 10/4, 10/7, 11/1, 11/4, 11/7, 12-15, 18, 20, 21/1, 21/4, 21/7, 23/1, 23/7, 24/1, 24/7, 25/1, 25/7, and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Yon-Hin et al. (US 6,440,645 B1).

Addressing claim 1, Yon-Hin et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel comprising a first substrate (shown in Figure 2 but not labeled. Also see col. 1, ll. 60-65) and a second substrate (not shown, but disclosed in col. 3, ll. 43-45) with a printed component (microchannel structure shown in Figure 2) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 4, ll. 50-64), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (implied by col. 3, ll. 43-45, which teaches that the second substrate may be a coverslip placed over the device assisting flow through the device by capillary action, for example).

Addressing claim 2, sealing contact of the printed component and both substrates is implied by Figure 2 and col. 3, ln. 43–47, which teaches that the printed component is used to form microfluidic channels useful for electrophoresis.

Addressing claim 3, forming the channel does not require etching or pre-forming the substrates (Figure 2 and col. 2, ll. 34-54).

Addressing claim 4, the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product

formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 is unpatentable for the same reasons as claim 1. (MPEP 2113).

Addressing claim 7, the second substrate provides a cover for the channel. (col. 3, ll. 43-45).

Addressing claims 8/1, 8/4, and 8/7, the component may be at least polymeric material (col. 4, ll. 50-53).

Addressing claims 10/1, 10/4, 10/7, 11/1, 11/4, and 11/7, at least one of the substrates may be transparent and may be made from plastic (col. 3, ll. 39-42 and col. 4, ll. 38-44).

Addressing claims 12 and 13, the channel in Figure 2 defined by the component may comprise epoxy (col. 1, ln. 66 – col. 2, ln. 10).

Addressing claims 14 and 15, straight channel walls that are parallel to each other are taught (Figure 2).

Addressing claims 18 and 20, the component can be at 5 to 300 microns thick (col. 5, ll. 63-67).

Addressing claims 21/1, 21/4, and 21/7, a variety of non-conductive components are disclosed (col. 1, ln. 66 – col. 2, ln. 10).

Addressing claims 23/1, and 23/7, Yon-Hin et al. teaches performing electrophoresis (col. 3, ll. 60-67).

Addressing claims 24/1, and 24/7, ends as claimed are shown in Figures 2 and 3. An electrolyte vial is implied by col. 3, ll. 60-67, which teaches performing electrophoresis.

Addressing claims 25/1, and 25/7, an entrance suitable to inject a sample into the channel for electrophoresis (col. 3, ll. 60-67 teaches performing electrophoresis) is shown in Figures 2 and 3. As for performing isoelectrophoresis on the sample this is intended use that does not further patentably distinguish the channel, barring a showing to the contrary.

Addressing claim 29, Yon-Hin et al. teach a microchannel for separating two or more substances in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel comprising a first substrate (shown in Figure 2 but not labeled. Also see col. 1, ll. 60-65) with printed component (microchannel structure shown in Figure 2) printed on the first substrate in a shape to define a perimeter of the channel (col. 4, ll. 50-64), there being no etching required.

8. Claims 1-5, 7, 8, 10/1, 10/4, 10/7, 11/1, 11/4, 11/7, 12-15, 19/1, 19/4, 19/7, 21/1, 21/4, 21/7, 26/1, 26/4, 26/7, and 29 are rejected under 35 U.S.C. 102(b) as being anticipated by Sibbald (GB 2275428 A).

Addressing claim 1, Sibbald teaches a microchannel for use for separating two or more substances present in a sample (abstract), the channel comprising a first substrate (2) and a second substrate (1) with a printed component (3) printed on at least one of the substrates in a shape to define a perimeter of the channel (abstract and Figures 1-3), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figures 1 and 2).

Addressing claim 2, sealing contact of the printed component and both substrates is implied by Figure 1 and the, which teaches that the printed component is used to form a chromatography channel.

Addressing claim 3, as seen from Figure 3 forming the channel does not require etching or pre-forming the substrates.

Addressing claim 4, the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 is unpatentable for the same reasons as claim 1. (MPEP 2113).

Addressing claim 5, in Figure 1 taking strip 3 on the left as the first part of the component and sealing strip 3 on the right as the second part of the component it is seen that they are aligned to form a channel (page 2, last full paragraph: "A chromatograph ...")

Addressing claim 7, the second substrate provides a cover for the channel (Figure 1).

Addressing claim 8, the component may be at least polymeric material (page 3, first full paragraph) or glass forming substance or solids dissolved or suspended in solvent (page 4, the full paragraph).

Addressing claims 10/1, 10/4, 10/7, 11/1, 11/4, 11/7, 26/1, 26/4, and 26/7 at least one of the substrates may be transparent or opaque and may be made from glass, plastic, or metal (page 3, first full paragraph and page 4, last paragraph).

Addressing claims 12 and 13, the channel in Figures 1-3 defined by the component may comprise epoxy (page 3, lines 1-4).

Addressing claims 14 and 15, straight channel walls that are parallel to each other are taught (Figure 3).

Addressing claims 19/1, 19/4, and 19/7, the channel has dimensions of 100 microns by 100 microns (paragraph at the top of page 3).

Addressing claims 21/1, 21/4, and 21/7, epoxy, for example, as a component is disclosed (page 3, lines 1-4).

Addressing claim 29, Sibbald teaches a microchannel for separating two or more substances in a sample (abstract), the channel comprising a first substrate (2) with printed component (3) printed on the first substrate in a shape to define a perimeter of the channel, there being no etching required.

9. Claims 1-8, 10/1, 10/4, 10/7, 11/1, 11/4, 11/7, 12-15, 17, 18, 19/1, 19/4, 19/7, 20, 21/1, 21/4, 21/7, 23/1, 23/4, 23/7, 24/1, 24/7, 25/1, 25/7 26/1, 26/4, 26/7, and 29 are rejected under 35 U.S.C. 102(e) as being clearly anticipated by Kennedy (US 6,074,725).

Addressing claim 1, Kennedy teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel comprising a first substrate (35) and a second substrate (5) with a printed component (15 or 20) printed on at least one of the substrates in a shape to define a perimeter of the channel (Figures 1-4 and col. 18, ll. 13-16), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 4 and col. 17, ll. 9-21).

Addressing claim 2, sealing contact of the printed component and both substrates is implied by Figure 4 and col. 1, ln. 65 – col. 2, ln. 7, which teaches that the printed component is used to form microfluidic channels.

Addressing claim 3, as seen from Figure 4 forming the channel does not require etching or pre-forming the substrates.

Addressing claim 4, the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 is unpatentable. (MPEP 2113).

Addressing claim 5, in Figure 4 taking element 20 as the first part of the component and element 15 as the second part of the component it is seen that they are aligned to form a channel (Figure 1)

Addressing claim 6, the first component and the second component contact each other to form reservoirs 25 and 30 (col. 17, ln. 66 – col. 18, ln. 2).

Addressing claim 7, the second substrate provides a cover for the channel. (Figure 4).

Addressing claim 8, the component may be at least polymeric material or gel (col. 11, ln. 64 – col. 12, ln. 6).

Addressing claims 10/1, 10/4, 10/7, 11/1, 11/4, 11/7, 26/1, 26/4, and 26/7 at least one of the substrates may be transparent and may be made from glass or plastic (col. 14, ln. 44 – col. 15, ln. 6).

Addressing claims 12 and 13, the channel in Figures 1 and 4 defined by the component may comprise epoxy (col. 11, ln. 64 – col. 12, ln. 6).

Addressing claims 14 and 15, straight channel walls that are parallel to each other are taught (Figure 1).

Addressing claim 17, the substrates may comprise polyethylene (col. 11, ll. 23-24).

Addressing claims 18, 19/1, 19/4, 19/7, and 20 the component can be at 50 to 100 microns thick (col. 18, ll. 33-39).

Addressing claims 21/1, 21/4, and 21/7, epoxy, for example, as a component is disclosed (col. 11, ln. 64 – col. 12, ln. 6).

Addressing claims 23/1, 23/4, and 23/7, Kennedy teaches performing electrophoresis (col. 1, ll. 1-64).

Addressing claims 24/1, and 24/7, ends as claimed are shown in Figures 1 and 5. An electrolyte vial is implied by col. 1, ll. 1-64, which teaches performing electrophoresis.

Addressing claims 25/1, and 25/7, an entrance suitable to inject a sample into the channel for electrophoresis (col. 1, ll. 1-64 teaches performing electrophoresis) is shown in Figures 1 and 5. As for performing isoelectrophoresis on the sample this is intended use that does not further patentably distinguish the channel, barring a showing to the contrary, especial since performing electrophoresis is disclosed.

Addressing claim 29, Kennedy teaches a microchannel for separating two or more substances in a sample (abstract and col. 1, ll. 1-55), the channel comprising a first substrate (35) with printed component (15 or 20) printed on the first substrate in a shape to define a perimeter of the channel, there being no etching required.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claim 9/4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sibbald (GB 2275428 A) in view of Soane et al. (US 6,176,962 B1).

Sibbald teaches a microchannel for use for separating two or more substances present in a sample (abstract), the channel comprising a first substrate (2) and a second substrate (1) with a printed component (3) printed on at least one of the substrates in a shape to define a perimeter of the channel (abstract and Figures 1-3), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figures 1 and 2).

As for the additional limitation required by claim 4, this is a product-by-process limitation. There is no apparent material difference between the product formed by

printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 does not further patentably distinguish claim 1. (MPEP 2113).

Although Sibbald discloses that the component may be at least polymeric material (page 3, first full paragraph) or glass forming substance or solids dissolved or suspended in solvent (page 4, the full paragraph), Sibbald does not mention having the component be a thermosetting modified silicon. Soane et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 28-33), the channel comprising a first substrate (14) and a second substrate (12) with a printed component (16) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 5, ll. 56-64 and col. 6, ll. 30-41), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 6 and col. 6, ll. 9-17). Soane further teaches that the component may comprise thermocured silicone gums (col. 8, ll. 39-49). Barring evidence to the contrary, such as unexpected results, the selection of the composition of the component from known component compositions, such as thermocured silicone gum as taught by Soane et al., was within the skill of one with ordinary skill in the art at the time of the invention. Some factors that one with ordinary skill in the art would consider is the desired bonding strength of the component to the substrates and chemical resistance to the separation solution (medium) and sample to be separated.

13. Claim 9/4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy (US 6,074,725) in view of Soane et al. (US 6,176,962 B1).

Kennedy teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel comprising a first substrate (35) and a second substrate (5) with a printed component (15 or 20) printed on at least one of the substrates in a shape to define a perimeter of the channel (Figures 1-4 and col. 18, ll. 13-16), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 4 and col. 17, ll. 9-21).

As for the additional limitation required by claim 4, this is a product-by-process limitation. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 does not further patentably distinguish claim 1. (MPEP 2113).

Although Kennedy discloses that the component may be at least polymeric material or gel (col. 11, ln. 64 – col. 12, ln. 6), Kennedy does not mention having the component be a thermosetting modified silicon. Soane et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 28-33), the channel comprising a first substrate (14) and a second substrate (12) with a printed component (16) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 5, ll. 56-64 and col. 6, ll. 30-41), the substrates being affixed to one another so that the component is sandwiched between the substrates and is

in contact with both substrates (Figure 6 and col. 6, ll. 9-17). Soane further teaches that the component may comprise thermocured silicone gums (col. 8, ll. 39-49). Barring evidence to the contrary, such as unexpected results, the selection of the composition of the component from known component compositions, such as thermocured silicone gum as taught by Soane et al., was within the skill of one with ordinary skill in the art at the time of the invention. Some factors that one with ordinary skill in the art would consider are the desired bonding strength of the component to the substrates and chemical resistance to the separation solution (medium) and sample to be separated (see col. 12, ll. 23-36 in Kennedy).

14. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Soane et al. (US 6,176,962 B1) in view of Parce et al. (US 6,465,257 B1).

Soane et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 28-33), the channel comprising a first substrate (14) and a second substrate (12) with a printed component (16) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 5, ll. 56-64 and col. 6, ll. 30-41), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 6 and col. 6, ll. 9-17).

Soane et al. only discloses straight channel walls that are parallel to each other (Figure 1).

Parce et al. teaches a microfluidic separation device having channels with walls tapered relative to one another (abstract and Figure 4). It would have been obvious to one with ordinary skill in the art at the time the invention was made provide tapered channels as taught by Parce et al. in the invention of Soane et al. because if fluid is to flow in multiple parallel channels then the tapered channels as taught by Parce et al. will allow equal flow rates in the parallel channels (col. 13, ln. 64 – col. 14, ln. 25).

15. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Yon-Hin et al. (US 6,440,645 B1) in view of Parce et al. (US 6,465,257 B1).

Yon-Hin et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel comprising a first substrate (shown in Figure 2 but not labeled. Also see col. 1, ll. 60-65) and a second substrate (not shown, but disclosed in col. 3, ll. 43-45) with a printed component (microchannel structure shown in Figure 2) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 4, ll. 50-64), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (implied by col. 3, ll. 43-45, which teaches that the second substrate may be a coverslip placed over the device assisting flow through the device by capillary action, for example).

Yon-Hin et al. only discloses straight channel walls that are parallel to each other (Figures 2-4).

Parce et al. teaches a microfluidic separation device having channels with walls tapered relative to one another (abstract and Figure 4). It would have been obvious to one with ordinary skill in the art at the time the invention was made provide tapered channels as taught by Parce et al. in the invention of Yon-Hin et al. because if fluid is to flow in multiple parallel channels then the tapered channels as taught by Parce et al. will allow equal flow rates in the parallel channels (col. 13, ln. 64 – col. 14, ln. 25).

16. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sibbald (GB 2275428 A) in view of Parce et al. (US 6,465,257 B1).

Sibbald teaches a microchannel for use for separating two or more substances present in a sample (abstract), the channel comprising a first substrate (2) and a second substrate (1) with a printed component (3) printed on at least one of the substrates in a shape to define a perimeter of the channel (abstract and Figures 1-3), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figures 1 and 2).

Sibbald. only discloses straight channel walls that are parallel to each other are taught (Figure 3).

Parce et al. teaches a microfluidic separation device having channels with walls tapered relative to one another (abstract and Figure 4). It would have been obvious to one with ordinary skill in the art at the time the invention was made provide tapered channels as taught by Parce et al. in the invention of Sibbald et al. because if fluid is to

flow in multiple parallel channels then the tapered channels as taught by Parce et al. will allow equal flow rates in the parallel channels (col. 13, ln. 64 – col. 14, ln. 25).

17. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy (US 6,074,725) in view of Parce et al. (US 6,465,257 B1).

Kennedy teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel comprising a first substrate (35) and a second substrate (5) with a printed component (15 or 20) printed on at least one of the substrates in a shape to define a perimeter of the channel (Figures 1-4 and col. 18, ll. 13-16), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 4 and col. 17, ll. 9-21).

Kennedy. only discloses straight channel walls that are parallel to each other are taught (Figures 1 and 5).

Parce et al. teaches a microfluidic separation device having channels with walls tapered relative to one another (abstract and Figure 4). It would have been obvious to one with ordinary skill in the art at the time the invention was made to provide tapered channels as taught by Parce et al. in the invention of Kennedy et al. because if fluid is to flow in multiple parallel channels then the tapered channels as taught by Parce et al. will allow equal flow rates in the parallel channels (col. 13, ln. 64 – col. 14, ln. 25).

18. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy (US 6,074,725) in view of Shiraishi et al. (US 4,699,680) and Ogawa et al. (US 4,769,408).

Kennedy teaches a microchannel for use for separating, by electrophoresis, two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel comprising a first substrate (35) and a second substrate (5) with a printed component (15 or 20) printed on at least one of the substrates in a shape to define a perimeter of the channel (Figures 1-4 and col. 18, ll. 13-16), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 4 and col. 17, ll. 9-21). Although Kennedy teaches that the substrates may be made from a variety of materials, including several polymers, polyethylene is not mentioned (col. 14, ll. 44-55).

Shiraishi et al. and Ogawa et al. show that is was known in the art at the time of the invention to use polyethylene sheets as substrates for electrophoresis medium (in Shiraishi et al. see col. 4, ll. 55-66 and in Ogawa et al. see col. 15, ll. 17-40). Barring evidence to the contrary, such as unexpected results, the selection of the composition of the substrate material from known substrate materials was within the capacity of one with ordinary skill in the art at the time of the invention. One would select the substrate composition based on factors such as weight, mechanical strength, transparency (if optical detection is used), and inertness to the separation solution or medium and the sample.

19. Claims 22/1 and 22/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soane et al. (US 6,176,962 B1).

Soane et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 28-33), the channel comprising a first substrate (14) and a second substrate (12) with a printed component (16) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 5, ll. 56-64 and col. 6, ll. 30-41), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 6 and col. 6, ll. 9-17). Soane et al. teaches various possible compositions for the component (col. 7, ln. 17 – col. 9, ln. 4). It would have been obvious to one with ordinary skill in the art at the time the invention was made to select a composition that is chemically inert and electrically inert to avoid contaminating or adversely interfering with the separation process.

For claim 22/7 note as seen in Figure 5 the second substrate provides a cover for the channel.

20. Claims 22/1, 22/4, 22/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yon-Hin et al. (US 6,440,645 B1).

Yon-Hin et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel comprising a first substrate (shown in Figure 2 but not labeled. Also see col. 1, ll. 60-65) and a second substrate (not shown, but disclosed in col. 3, ll. 43-45) with a printed component (microchannel structure shown in Figure 2) printed on at least one of the

substrates in a shape to define a perimeter of the channel (col. 4, ll. 50-64), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (implied by col. 3, ll. 43-45, which teaches that the second substrate may be a coverslip placed over the device assisting flow through the device by capillary action, for example). Yon-Hin et al. teaches various possible compositions for the component (col. 1, ln. 66 – col. 2, ln. 10). It would have been obvious to one with ordinary skill in the art at the time the invention was made to select a composition that is chemically inert and electrically inert to avoid contaminating or adversely interfering with the separation process.

For claim 22/4 note that the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 is unpatentable for the same reasons as claim 1. (MPEP 2113).

For claim 22/7 note that the second substrate provides a cover for the channel. (col. 3, ll. 43-45).

21. Claims 22/1, 22/4, 22/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sibbald (GB 2275428 A).

Sibbald teaches a microchannel for use for separating two or more substances present in a sample (abstract), the channel comprising a first substrate (2) and a second substrate (1) with a printed component (3) printed on at least one of the substrates in a

shape to define a perimeter of the channel (abstract and Figures 1-3), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figures 1 and 2). Sibbald teaches various possible compositions for the component (page 3, first full paragraph and page 4, the full paragraph). It would have been obvious to one with ordinary skill in the art at the time the invention was made to select a composition that is chemically inert and electrically inert to avoid contaminating or adversely interfering with the separation process.

For claim 22/4, the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 is unpatentable. (MPEP 2113).

For claim 22/7 note that the second substrate provides a cover for the channel. (Figure 1).

22. Claims 22/1, 22/4, 22/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy (US 6,074,725).

Kennedy teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel comprising a first substrate (35) and a second substrate (5) with a printed component (15 or 20) printed on at least one of the substrates in a shape to define a perimeter of the channel (Figures 1-4 and col.

18, ll. 13-16), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 4 and col. 17, ll. 9-21). Kennedy teaches various possible compositions for the component (col. 11, ln. 64 – col. 12, ln. 6). It would have been obvious to one with ordinary skill in the art at the time the invention was made to select a composition that is chemically inert and electrically inert to avoid contaminating or adversely interfering with the separation process.

For claim 22/4 note that the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 is unpatentable. (MPEP 2113).

For claim 22/7 note that the second substrate provides a cover for the channel. (Figure 4).

23. Claims 27/1 and 27/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soane et al. (US 6,176,962 B1) in view of Ekström et al. (US 5,376,252).

Soane et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 28-33), the channel comprising a first substrate (14) and a second substrate (12) with a printed component (16) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 5, ll. 56-64 and col. 6,

ll. 30-41), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 6 and col. 6, ll. 9-17).

Soane et al. does not mention means to pass light through the entire channel to permit whole column imaging detection. Ekström et al. teaches a microfluidic device having a sandwich structure and means to pass light through the entire channel to permit whole column imaging detection (abstract; Figure 7A; and col. 9, ll. 48-56). It would have been obvious to one with ordinary skill in the art at the time the invention was made to provide means to pass light through the entire channel to permit whole column imaging detection as taught by Ekström et al. in the invention of Soane et al. because then sample components of interest can de detected earlier then they normally would be. Detectors are normally placed near the end of the separation channel By imaging the entire channel sample components of interest that are separated out early in the separation channel will be detected earlier then if detection only occurred near the end of the channel. This would save time and money if only these early separated components are of interest since the separation can be stopped after their detection.

For claim 27/7 note that as seen in Figure 5 the second substrate provides a cover for the channel.

24. Claims 27/1, 27/4, and 27/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yon-Hin et al. (US 6,440,645 B1) in view of Ekström et al. (US 5,376,252).

Yon-Hin et al. teaches a microchannel for use for separating two or more substances present in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel comprising a first substrate (shown in Figure 2 but not labeled. Also see col. 1, ll. 60-65) and a second substrate (not shown, but disclosed in col. 3, ll. 43-45) with a printed component (microchannel structure shown in Figure 2) printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 4, ll. 50-64), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (implied by col. 3, ll. 43-45, which teaches that the second substrate may be a coverslip placed over the device assisting flow through the device by capillary action, for example).

Yon-Hin et al. does not mention means to pass light through the entire channel to permit whole column imaging detection. Ekström et al. teaches a microfluidic device having a sandwich structure and means to pass light through the entire channel to permit whole column imaging detection (abstract; Figure 7A; and col. 9, ll. 48-56). It would have been obvious to one with ordinary skill in the art at the time the invention was made to provide means to pass light through the entire channel to permit whole column imaging detection as taught by Ekström et al. in the invention of Yon-Hin et al. because then sample components of interest can de detected earlier then they normally would be. Detectors are normally placed near the end of the separation channel By imaging the entire channel sample components of interest that are separated out early in the separation

channel will be detected earlier then if detection only occurred near the end of the channel. This would save time and money if only these early separated components are of interest since the separation can be stopped after their detection.

For claim 27/4 note that the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 27/4 is unpatentable for the same reasons as claim 27/1. (MPEP 2113).

For claim 27/7 note that the second substrate provides a cover for the channel. (col. 3, ll. 43-45).

25. Claims 27/1, 27/4, and 27/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sibbald (GB 2275428 A) in view of Ekström et al. (US 5,376,252).

Sibbald teaches a microchannel for use for separating two or more substances present in a sample (abstract), the channel comprising a first substrate (2) and a second substrate (1) with a printed component (3) printed on at least one of the substrates in a shape to define a perimeter of the channel (abstract and Figures 1-3), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figures 1 and 2).

Sibbald et al. does not mention means to pass light through the entire channel to permit whole column imaging detection. Ekström et al. teaches a microfluidic device

having a sandwich structure and means to pass light through the entire channel to permit whole column imaging detection (abstract; Figure 7A; and col. 9, ll. 48-56). It would have been obvious to one with ordinary skill in the art at the time the invention was made to provide means to pass light through the entire channel to permit whole column imaging detection as taught by Ekström et al. in the invention of Sibbald et al. because then sample components of interest can de detected earlier then they normally would be. Detectors are normally placed near the end of the separation channel By imaging the entire channel sample components of interest that are separated out early in the separation channel will be detected earlier then if detection only occurred near the end of the channel. This would save time and money if only these early separated components are of interest since the separation can be stopped after their detection.

For claim 27/4 note that the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 27/4 is unpatentable for the same reasons as claim 27/1. (MPEP 2113).

For claim 27/7 note that the second substrate provides a cover for the channel (Figure 1).

27. Claims 27/1, 27/4, and 27/7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy (US 6,074,725) in view of Ekström et al. (US 5,376,252).

Kennedy teaches a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel comprising a first substrate (35) and a second substrate (5) with a printed component (15 or 20) printed on at least one of the substrates in a shape to define a perimeter of the channel (Figures 1-4 and col. 18, ll. 13-16), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 4 and col. 17, ll. 9-21).

Kennedy. does not mention means to pass light through the entire channel to permit whole column imaging detection. Ekström et al. teaches a microfluidic device having a sandwich structure and means to pass light through the entire channel to permit whole column imaging detection (abstract; Figure 7A; and col. 9, ll. 48-56). It would have been obvious to one with ordinary skill in the art at the time the invention was made to provide means to pass light through the entire channel to permit whole column imaging detection as taught by Ekström et al. in the invention of Kennedy et al. because then sample components of interest can de detected earlier then they normally would be. Detectors are normally placed near the end of the separation channel By imaging the entire channel sample components of interest that are separated out early in the separation channel will be detected earlier then if detection only occurred near the end of the channel. This would save time and money if only these early separated components are of interest since the separation can be stopped after their detection.

For claim 27/4 note that the additional limitations required by this claim are product-by-process limitations. There is no apparent material difference between the product formed by printing a first part of the component on the first substrate and a second part of the component on the second channel and the product formed by printing both the first and second parts of the component on the same substrate. Thus, claim 4 is unpatentable. (MPEP 2113).

For claim 27/7 note that the second substrate provides a cover for the channel. (Figure 4).

28. Claims 30-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yon-Hin et al. (US 6,440,645 B1) in view of Soane et al. (US 6,176,962 B1)

Addressing claim 30, Yon-Hin et al. teaches a method of constructing a microchannel for use for separating two or more substances present in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel having a first substrate (shown in Figure 2 but not labeled. Also see col. 1, ll. 60-65) and a second substrate (not shown, but disclosed in col. 3, ll. 43-45), printing a channel on at least one of the substrates using printing techniques depositing a printed component in the shape of a perimeter of a channel on the at least one substrate (col. 4, ll. 50-64), curing the at least one substrate and affixing the substrates to one another channel on at least one of the component printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 4, ll. 50-55), the substrates being affixed to one another so that the component is

sandwiched between the substrates and is in contact with both substrates (implied by col. 3, ll. 43-45, which teaches that the second substrate may be a coverslip placed over the device assisting flow through the device by capillary action, for example).

Yon-Hin et al. does not mention cleaning the substrates. Soane et al. a method of making a micofluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Yon-Hill et al. because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col.. 9, ll. 51-59).

Addressing claim 31, Yon-Hill et al. teaches at least screen-printing (col. 1, ln. 66 – col. 2, ln. 21).

Addressing claim 32, Yon-Hill teaches performing electrophoresis (col. 3, ll. 60-67), but does not mention isoelectrophoresis, however, it would been obvious to one with ordinary skill in the art at the time the invention was made to perform isoelectrophoresis if proteins are to be separated since this is commonly used electrophoresis technique for separating proteins.

Addressing claim 33, Yon-Hin et al. teaches a method of constructing a microchannel that is suitable for use for separating two or more substances present in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel having a first substrate

(shown in Figure 2 but not labeled. Also see col. 1, ll. 60-65) and a cover for the substrate (not shown, but disclosed in col. 3, ll. 43-45), the method comprising printing a channel on the substrate using printing techniques depositing a printed component in the shape of a perimeter of a channel on the at least one substrate (col. 4, ll. 50-64), curing the substrate and affixing the cover to the substrate with the channel sandwiched between the substrate and the cover (col. 4, ll. 50-55 and col. 3, ll. 43-45, which teaches that the second substrate may be a coverslip placed over the device assisting flow through the device by capillary action, for example).

Yon-Hin et al. does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Yon-Hill et al. because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col. 9, ll. 51-59).

Addressing claim 34, Yon-Hill et al. teaches a method of constructing a microchannel that is suitable for use separating two or more substances present in a sample (abstract; col. 1, ll. 8-20; and col. 4, ll. 63-66), the channel having a first substrate (shown in Figure 2, but not labeled. Also see col. 1, ll. 60-65), the method comprising printing a channel on the first substrate using printing techniques by depositing a printed component in the shape of a perimeter of a channel on the first substrate and curing the first substrate (col. 4, ll. 50-64).

Yon-Hin et al. does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Yon-Hill et al. because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col.. 9, ll. 51-59).

29. Claims 30, 31, 33, and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sibbald (GB 2275428 A) in view of Soane et al. (US 6,176,962 B1)

Addressing claim 30, Sibbald teaches a method of constructing a microchannel for use for separating two or more substances present in a sample (abstract), the channel having a first substrate (2) and a second substrate (1), printing a channel (3) on at least one of the substrates using printing techniques depositing a printed component in the shape of a perimeter of a channel on the at least one substrate (page 2 last line bridging over to the paragraph on the top of page 3 and the first full paragraph on page3), curing the at least one substrate and affixing the substrates to one another channel on at least one of the component printed on at least one of the substrates in a shape to define a perimeter of the channel (top paragraph on page 3 and second full paragraph on page 3), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figures 1 and 2).

Sibbald does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Sibbald et al. because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col.. 9, ll. 51-59).

Addressing claim 31, Sibbald teaches at least screen-printing (abstract).

Addressing claim 33, Sibbald teaches a method of constructing a microchannel that is suitable for use for separating two or more substances present in a sample (abstract), the channel having a first substrate (2) and a cover (1) for the substrate, the method comprising printing a channel on the substrate using printing techniques depositing a printed component in the shape of a perimeter of a channel on the at least one substrate (page 2 last line bridging over to the paragraph on the top of page 3 and the first full paragraph on page 3), curing the substrate and affixing the cover to the substrate with the channel sandwiched between the substrate and the cover (top paragraph on page 3 and second full paragraph on page 3 and Figures 1 and 2).

Sibbald does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and

col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Sibbald et al. because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col. 9, ll. 51-59).

Addressing claim 34, Sibbald et al. teaches a method of constructing a microchannel that is suitable for use separating two or more substances present in a sample (abstract), the channel having a first substrate (2), the method comprising printing a channel on the first substrate using printing techniques by depositing a printed component in the shape of a perimeter of a channel on the first substrate and curing the first substrate (page 2, last line bridging over to the paragraph on the top of page 3, and the first and second full paragraphs on page 3).

Sibbald does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Sibbald because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col.. 9, ll. 51-59).

30. Claims 30-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kennedy (US 6,074,725) in view of Soane et al. (US 6,176,962 B1)

Addressing claim 30, Kennedy teaches a method of constructing a microchannel for use for separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel having a first substrate (35) and a second substrate (5), printing a channel (15 or 20) on at least one of the substrates using printing techniques depositing a printed component in the shape of a perimeter of a channel on the at least one substrate (Figures 1-4 and col. 18, ll. 13-16), curing the at least one substrate and affixing the substrates to one another channel on at least one of the component printed on at least one of the substrates in a shape to define a perimeter of the channel (col. 17, ll. 40-50), the substrates being affixed to one another so that the component is sandwiched between the substrates and is in contact with both substrates (Figure 4 and col. 17, ll. 9-21).

Kennedy does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Kennedy because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col.. 9, ll. 51-59).

Addressing claim 31, Kennedy teaches at least ink jet printing (abstract).

Addressing claim 32, Kennedy teaches performing electrophoresis (col. 1,

ll. 1-64), but does not mention isoelectrophoresis, however, it would been obvious to one with ordinary skill in the art at the time the invention was made to perform isoelectrophoresis if proteins are to be separated since this is commonly used electrophoresis technique for separating proteins.

Addressing claim 33, Kennedy teaches a method of constructing a microchannel that is suitable for use for separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel having a first substrate (35) and a cover (5) for the substrate, the method comprising printing a channel on the substrate using printing techniques depositing a printed component in the shape of a perimeter of a channel on the at least one substrate (Figures 1-4 and col. 18, ll. 13-16), curing the substrate and affixing the cover to the substrate with the channel sandwiched between the substrate and the cover (col. 17, ll. 40-50; Figure 4; and col. 17, ll. 9-21).

Kennedy does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Kennedy because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col. 9, ll. 51-59).

Addressing claim 34, Kennedy et al. teaches a method of constructing a microchannel that is suitable for use separating two or more substances present in a sample (abstract and col. 1, ll. 1-55), the channel having a first substrate (35), the method comprising printing a channel (15 or 20) on the first substrate using printing techniques by depositing a printed component in the shape of a perimeter of a channel on the first substrate and curing the first substrate (Figures 1-; col. 18, ll. 13-16; and col. 17, ll. 40-50).

Kennedy does not mention cleaning the substrates. Soane et al. a method of making a microfluid device involving cleaning a substrate before depositing a component, which will form a perimeter of a channel (abstract; Figures 1, 5, and 6; and col. 9, ll. 51-59). It would have been obvious to one with ordinary skill in the art at the time the invention was made to clean a substrate as taught by Soane et al. in the invention of Kennedy because as taught by Soane et al. this will improve wettability of the surface of the substrate by the component (col.. 9, ll. 51-59).

31. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX NOGUEROLA whose telephone number is (571) 272-1343. The examiner can normally be reached on M-F 8:30 - 5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, NAM NGUYEN can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Alex Noguerola 4/28/04

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